

Additions to the Hygrocybeae (Fungi, Hygrophoraceae) of Victoria. I.

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Abstract

Herbarium material from the Jumping Creek Nature Walk of the Warrandyte State Park (Victoria) includes previously described taxa both known from and new to Australia, as well as five undescribed species. Taxa previously known from Australia include *Hygrocybe austropratensis* A.M.Young, *H. cheelii* A.M.Young, *H. leucogloea* A.M.Young, *H. rodwayi* (Massee) A.M.Young and *H. virginea* var. *virginea* (Wulfen : Fr.) P.D.Orton & Watling. Two taxa, *Hygrocybe psittacina* var. *perplexa* (A.H.Sm. & Hesler) Boertm. and *H. virginea* var. *fuscescens* (Bres.) Arnolds, are new records for Australia. Three new species are described: *Hygrocybe arcohostata*, *H. fuhreri* and *H. saltorivula*. The herbarium material also contains three collections which represent two species believed to be new taxa, but for which it is considered there is insufficient material for a valid description and deposition of a suitable type. Descriptions of these two taxa have been provided to assist with further studies of the Jumping Creek taxa.

Introduction

The Warrandyte State Park is located 25 kilometres north-east of Melbourne (Victoria, Australia) and is on the east bank of the Yarra River. Within the park is the Jumping Creek Nature Walk which passes through various vegetation communities, including the kunzea thickets that contained the fungi examined during this study.

The park receives an annual rainfall of about 600 mm with a greater part of this rainfall occurring during the late autumn and winter months of May to August. Rainfall is somewhat erratic and there can be extended dry periods. The dry, siltstone ridges of the park support open stands of *Eucalyptus polyanthemos* (red box) sometimes mixed with *E. radiata* (narrow-leaved peppermint). The slopes running towards the river are mostly alluvial soils and the trees supported include *E. viminalis* (manna gum), *E. melliodora* (yellow box) and *E. goniocalyx* (long-leaved box). These slopes also have an extensive shrub understorey which includes *Pomaderris prunifolius*, *Correa glabra* and *Kunzea ericoides* (burgan) (Anon. 1997; B.A.Fuhrer, pers. comm.).

Parts of the reserve bordering the nature walk are dominated by very dense thickets of *K. ericoides* about 2–3 metres in height. These thickets replace the usual dominant trees (*Eucalyptus* spp.) which are sometimes slowly killed as an indirect result of the feeding activities of *Manorina melanophrys* (bell miner). The bell miner is a native bird species that feeds on, but also encourages the spread of, lerp insects which can, in large infestations, severely damage eucalypt foliage. The kunzea thickets produce a very extensive and dense canopy which prevents eucalypt germination and re-growth but which also provides a microclimate with ideal conditions for the formation of dense moss and lichen beds on the ground-surface. The moss species present include *Thuidium furfurosus* and *Ptychomnion aciculare* and they in turn provide an ideal habitat for fungal species that require such conditions (B.A.Fuhrer, pers. comm.). The moss beds, with their maintenance of suitable conditions of temperature, moisture and humidity, are the critical factor that allows the Hygrophoraceae to flourish within the park, because the rainfall is too erratic and the normal woodland or forest litter within the park is too exposed to dessication to permit occurrence of the Hygrophoraceae unless there are very unusual climatic conditions.

Materials and Methods

Fourteen, air-dried collections from the Jumping Creek Nature Walk locality were examined. Field notes accompany each collection, but these are often incomplete and the notes were supplemented using information obtained from very high quality photographs that were made of each collection under natural conditions. Standardised colour codes were not provided with the herbarium collections. All material has been deposited at the National Herbarium of Victoria (MEL).

Descriptions and illustrations are provided for the new taxa and for those species which are either not illustrated in previous papers (Young & Wood 1997; Young 1999) or which require additional text or diagrams as a result of new information. The habit-sketch shows basidiome dimensions. Transverse sections (either drawn or photographed) were not provided with the collection material. The microstructures of the pileus, hymenophoral trama and stipe are generally not depicted because they usually conform to standard forms (Young & Wood 1997). For each illustrated specimen, 20 spores and 10 basidia were selected at random, drawn and measured. Scale bars are provided for all drawings: habit sketches, 10 mm; all microstructures, 10 μm . The derived parameter 'Q' is defined as the quotient of the length divided by the width of the relevant spore or basidium; the mean 'Q' is the quotient of the mean length and width respectively.

This paper lists several species of Hygrophoraceae originally collected and described from Europe for which no types are designated (Boertmann pers. comm.). This problem has already been addressed (Young 2000) and where types for European taxa do not exist, the species concepts of Boertmann (1995) are used.

Species: Information and Descriptions

1. *Hygrocybe austropratensis* A.M.Young, *Austrobaileya* 5: 546 (1999). *Type*: New South Wales. Lane Cove Bushland Park, 33°49'S 151°10'E, 7.vi.1998, R. & E.Kearney *s.n.* (holotype DAR 73916; isotype BRI).

Illustration: Young (1999), p. 546.

Habitat: Gregarious or caespitose on soil amongst moss.

Material examined: VICTORIA. Warrandyte State Park, 23.v.1996, B.A.Fuhrer 2055 (MEL 2063194).

Remarks: The macrocharacters of the Jumping Creek material agree with those of the type description. The swollen stipe base observed in the holotype material is also present in the Victorian collection, suggesting that the characteristic is not peculiar to the Lane Cove collections. A swollen stipe base does not appear in the closely related European *Hygrocybe pratensis* (Pers. : Fr.) Murrill; other characters which also separate *H. pratensis* are discussed in Young (1999). The spores of the Victorian material (5.5–8 \times 4.5–6 μm , mean 6.8 \times 5.3 μm , Q: 1.1–1.5, mean Q: 1.28) are slightly smaller than those of the type (6–8.3(–9) \times 5–7.3 μm , mean 7.5–6.3 μm , Q: 1.1–1.4, mean Q: 1.2) but the two ranges overlap so extensively that the difference is not considered significant. The basidia of the Jumping Creek collection also show the same smaller size (44–59 \times 6–8 μm , mean 50.7 \times 6.8 μm , Q: 6.1–8.8, mean Q: 7.48) compared with the type (53–69 \times 6–8 μm , mean 62.0 \times 6.8 μm , Q: 6.6–10.2(–12.6), mean Q: 9.20) but again the overlap is considerable and the differences are not considered significant. Only the type collection was previously known.

2. *Hygrocybe cheelii* A.M.Young, *Austrobaileya* 5: 547 (1999). *Type*: New South Wales. Gladesville, 17.vi.1916, J.B.Cleland *s.n.* (holotype AD 3418). *Cautharellus lilacinus* Cleland & Cheel, *Trans. & Proc. Roy. Soc. S. Australia* 43: 271 (1919). *Type*: New South Wales. Gladesville, 17.vi.1916, J.B.Cleland *s.n.* (holotype AD 3418). *Camarophyllus*

lilacinus (Cleland & Cheel) E.Horak, *New Zealand J. Bot.* 28: 203 (1990) non *Hygrocybe lilacina* (C.Laest. ex P.Karst.) M.Moser, *Die Röhrlinge und Blätterpilze (Agaricales)* 3 ed., 64 (1967).

Illustrations: Young (1999), p. 547; Willis (1963), plate 9, fig.1 as *Cantharellus lilacinus*; Cleland & Cheel (1919), Plate 29, fig.1.

Habitat: Gregarious amongst leaf mould and moss under *Kunzea ericoides*.

Material examined: VICTORIA. Warrandyte State Park, 4.vi.1995, B.A.Fuhrer1937 (MEL 2063188).

Remarks: The macrocharacters of the basidiomes in MEL 2063188 conform very closely to those of the holotype description (Cleland & Cheel 1919) and the material previously described from the Lane Cove Bushland Park (Young 1999). The differences in spore dimensions are insignificant: the Jumping Creek Nature Walk material has spores that measure 7–10 × 4.5–5.5(–6.5) µm, mean 8.4 × 5.4 µm, Q: 1.3–1.8, mean Q: 1.56; the holotype description gives the spores as 7–8.5 × 4.5–5.5 µm, and re-examination of the type gave spores measuring 6.0–8.5 × 4.5–6.0 µm, mean 7.2 × 5.5 µm, Q: 1.2–1.7 and mean Q: 1.5.

The holotype collection is in very poor condition due to insect attack and original preservation. Obtaining critical information from this material is quite difficult especially since almost nothing remains of the lamellae. For these reasons, two collections, B.A. Fuhrer 1937, (MEL 2063188), and *hb young 2118* (BRI) are here nominated as exemplar material as each is considered identical to the holotype in all significant respects (Young 1999). The collection in the Queensland Herbarium (BRI) is particularly significant as it contains material that was collected within approximately 10 kilometres of the original 1916 collection of the holotype at Gladesville, New South Wales.

3. *Hygrocybe leucogloea* A.M.Young, in Young & Wood, *Austral. Syst. Bot.* 10: 976 (1997). *Type*: New South Wales. Mt. Wilson, 33°30'S 150°22'E, 29.iv.1989, A.E.Wood s.n. (holotype UNSW 89/87).

Illustration: Young & Wood (1997), p. 984.

Habitat: Gregarious or caespitose in moss amongst litter.

Material examined: VICTORIA. Warrandyte State Park, 23.v.1996, B.A.Fuhrer 2060 (MEL 2063192).

Remarks: The first Victorian record of *Hygrocybe leucogloea* was from the Black Range State Forest (Young 2000). The Jumping Creek Nature Walk collection has spores that measure 6–7(–8) × 4–5(–5.5) µm, mean 6.7 × 4.5 µm, Q: 1.3–1.7, mean Q: 1.50, a slightly smaller mean and reduced upper range when compared with spores of the holotype collection [(6.3–)6.5–7.9(–8.5) × 4.0–5.6 µm, mean 7.2 × 4.8 µm, Q: 1.2–1.7, mean Q: 1.50]. Although medallion clamps are present on the hyphae of the ixotrichoderm in the holotype collection, none were found on the relevant hyphae of the Jumping Creek Nature Walk collection although clamps were abundant. This difference is thought to be part of a morphological range of basidiome variations likely to be encountered in this taxon.

4. *Hygrocybe psittacina* var. *perplexa* (A.H.Sm. & Hesler) Boertm., *Fungi of Northern Europe*. 1: 82 (1995). *Type*: U.S.A. Michigan, Cheboygan County, T.E.Brooks & A.H.Smith 21491 (holotype MICH 10924, n.v.). *Hygrophorus perplexus* A.H.Sm. & Hesler, *Sydowia* 8: 328 (1954). *Hygrocybe perplexa* (A.H.Sm. & Hesler) Arnolds, *Persoonia* 12: 477 (1985).

Illustration: Boertmann (1995), p. 83.

Pileus 15–30 mm, orange-brown to reddish brown but darker at the centre, convex becoming plane or upturned but then retaining an umbo at the centre, very glutinous, strongly striate at the margins and for up to one-third of the pileal diameter, margins paler and a little crenulate. *Lamellae* adnate to narrowly adnate, pinkish buff, thick, distant, margins concolorous and even. *Stipe* 30–45 × 2–3 mm, orange-red but paler at the apex, smooth, cylindrical, very glutinous.

Spores 6–8(–9) × 4–5.5 μm, mean 7.0 × 4.8 μm, Q: 1.2–1.6(–1.8), mean Q: 1.46, broadly ellipsoid to obovoid or sub-lacrymoid or occasionally sub-globose, smooth, hyaline, thin-walled, inamyloid. *Basidia* (27–)31–47 × 7–9.5 μm, mean 38.2 × 8.0 μm, Q: 3.9–6.2, mean Q: 4.78, (2-) 4-spored, clavate, hyaline, thin-walled, clamped and sometimes of medallion form. *Cystidia* absent. *Hymenophoral trama* regular in the upper two-thirds of the lamellae but sub-regular to irregular in the lower one-third nearest the margins; regular trama composed of short, parallel, thin-walled, hyaline elements 33–35 × 5–22 μm, clamps present; sub-regular to irregular trama composed of ellipsoid to sub-globose, hyaline, thin-walled elements 15–5 × 7–3.5 μm, clamps not seen. *Lactifers* may be present in the regular trama section and appear as meandering, contorted, hyaline hyphae 3–5 μm diameter, but do not exhibit the typical very high refractive index and may be overlooked. *Pileipellis* a very well defined ixotrichoderm 50–120 μm in thickness and composed of thin-walled, hyaline, septate, cylindrical hyphae 1.5–3.5 μm diameter, usually with apices that are rounded or slightly swollen, clamped and sometimes of

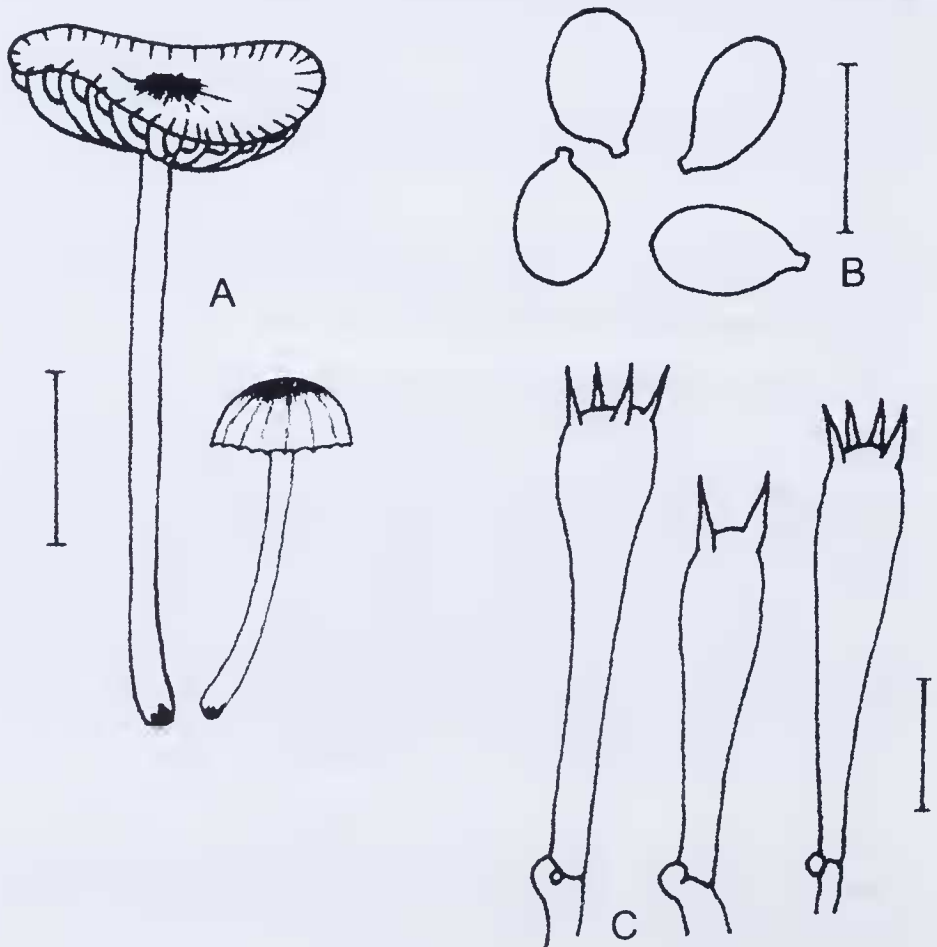


Figure 1. *Hygrocybe psittacina* var. *perplexa*. A habit sketch; B spores; C basidia.

medallion form. *Stipitipellis* a well developed ixotrichoderm composed of hyaline, thin-walled, septate hyphae 1.5–5mm diameter, medallion clamps usually present. (Fig. 1)

Habitat: Gregarious in moss and litter under *Kunzea ericoides*.

Material examined: VICTORIA. Warrandyte State Park, 10.vi.1994, B.A.Fuhrer 1994 (MEL 2063197).

Remarks: The material in MEL 2063197 agrees almost exactly with the description of the taxon given in Boertmann (1995) which has spores measuring (6–)7–8.5(–9) × (4–)4.5–5.5(–6) µm, Q: 1.4–1.9 mean Q: 1.5–1.6, and basidia measuring 36–50 × 7–8 µm which have medallion clamps at their bases. Basidiomes of *Hygrocybe psittacina* var. *perplexa* are readily separated from brownish red basidiomes of *H. grauinicolor*, because the latter have umbilicate pilei and arcuate or decurrent lamellae with cheilocystidia embedded in a glutinous thread on their margins.

This is the first confirmed record of this Northern Hemisphere taxon for Australia. The species was first described from North America but is also known from Europe (Boertmann 1995; Arnolds 1990) and Japan (Imazeki, Otani & Hongo 1988).

5. *Hygrocybe rodwayi* (Masse) A.M.Young, in A.M.Young & A.E.Wood, *Austral. Syst. Bot.* 10: 923 (1997). *Hygrophorus rodwayi* Masse, *Bull. Misc. Inform. Kew* 1899: 178 (1899). *Type*: Tas. Kingston Rd. (nr. Hobart), undated, *L.Rodway* 137 (holotype K). *Camarophyllus rodwayi* (Masse) Monks & A.K.Mills in Banks *et al.* (eds), *Aspects of Tasmanian Botany – A Tribute to Winifred Curtis* 13 (1991).

Illustrations: Young & Wood (1997), p. 925; Fuhrer & Robinson (1992), p. 39.

Habitat: Gregarious in moss.

Material examined: VICTORIA. Warrandyte State Park, 23 May 1996, B.A.Fuhrer 2059 (MEL 2063193).

Remarks: This collection has sub-globose to globose spores measuring (4.5–)5.5–6(–7) × (4–)4.5–5.5 µm, mean 5.7 × 4.8 µm, Q: 1.0–1.4, mean Q: 1.18. This agrees very well with the holotype collection, which has similar spores measuring 5–7 × 4–6 µm, mean 5.8 × 5.1 µm, Q: 1.0–1.3(–1.4), mean Q: 1.15. The photographic material accompanying the Warrandyte collection depicts basidiomes that have a strong resemblance to the other common white taxon, *Hygrocybe virginea* var. *virginea* (Wulfen : Fr.) P.D.Orton & Watling, but the two are always separable microscopically because *H. virginea* var. *virginea* has much larger, ellipsoid spores measuring 8–11(–12) × 5–8 µm. *Hygrocybe rodwayi* occurs in eastern Australian forests from the Sydney region to Tasmania (Young & Wood 1997; Young 2000).

6. *Hygrocybe virginea* (Wulfen : Fr.) P.D.Orton & Watling, *Notes Roy. Bot. Gard. Edinburgh* 29: 132 (1969). *Agaricus virgineus* Wulfen, in Jacq., *Misc. austr.* 2: 104 (1781). *Type*: none designated. *A. virgineus* Wulfen : Fr., *Syst. mycol.* 1: 100 (1821); *Hygrophorus virgineus* (Wulfen : Fr.) Fr., *Epicr.*: 327 (1838); *Camarophyllus virgineus* (Wulfen : Fr.) P.Kumm., *Führ. Pilzk.*: 117 (1871).

Agaricus niveus Scop., *Fl. caru.*, Ed. 2, 2: 430 (1772). *Type*: none designated. *A. virgineus* var. *niveus* (Scop.) Fr., *Syst. mycol.* 1: 100 (1821); *Hygrophorus niveus* (Scop.) Fr., *Epicr.*: 327 (1838); *Camarophyllus niveus* (Scop.) Wunsche, *Pilze*: 115 (1877).

Key to varieties of *Hygrocybe virginea*

1. Pileus pure white; spores ellipsoid, rarely constricted.....6a. var. *virginea*
1. Pileus brown at the centre; spores ellipsoid, often cylindrical and constricted
.....6b. var. *fuscescens*

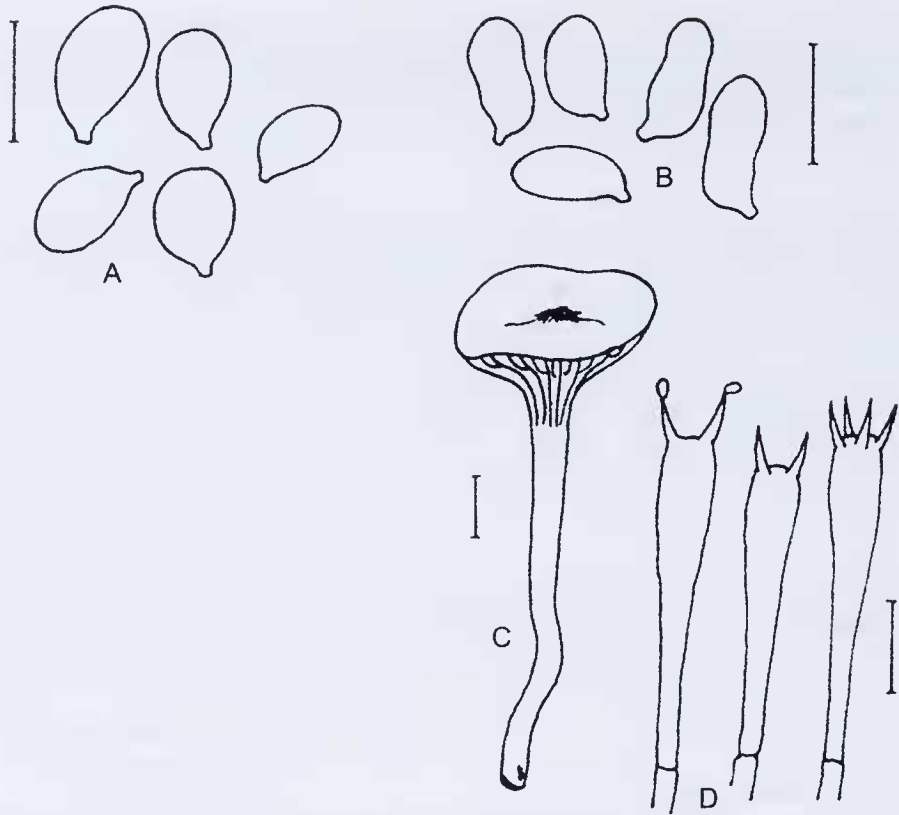


Figure 2. *Hygrocybe virginea*, var. *virginea*. **A** spores, var. *fuscescens*. **B** spores; **C** habit sketch; **D** basidia.

6a. var. *virginea* (Fig. 2)

Illustrations: Young & Wood (1997), p. 929; Boertmann (1995), p. 49.

Habitat: Gregarious in moss under *Kuuzea ericoides*.

Material examined: **VICTORIA.** Warrandyte State Park, 10.vi.1995, *B.A.Fuhrer 1942* (MEL 2063190); Warrandyte State Park, 10.vi.1995, *B.A.Fuhrer 1943* (MEL 2063198).

Remarks: These collections have macroscopic characters that agree very closely with those previously described for Australian material (Young & Wood 1997; Young 1999). There are minor microscopic variations. Collection MEL 2063190 contains basidiomes with 2-spored basidia and spores that display occasional small constrictions measuring 8–11(–12) × 5–8 µm, mean 9.6 × 6.4 µm, Q: 1.2–1.8, mean Q: 1.50; clamps are absent throughout the basidiome. Collection MEL 2063198 contains basidiomes that have 4-spored basidia and spores measuring 6–8(–9) × 3.5–6.5 µm, mean 7.3 × 4.6 µm, Q: 1.3–1.8(–1.9), mean Q: 1.6. Basidiomes with either or both 2-spored and 4-spored basidia are reported in Boertman (1995) and the Australian material agrees fully with that description.

Previous papers (Young & Wood 1997; Young 1999) recorded this taxon as *Hygrocybe virginea* (Wulfen : Fr.) P.D.Orton & Watling. The Jumping Creek collections conform very closely with European descriptions of var. *virginea*.

6b. var. *fuscescens* (Bres.) Arnolds, *Persoonia* 12: 477 (1985). *Type:* none designated. *Hygrophorus uivens* var. *fuscescens* Bres., *Iconogr. mycol.* 7: pl. 330 (1928).

Illustration: Boertmann (1995), p. 51.

Spores 8–11 × 4–6 µm, mean 9.5 × 4.9 µm, Q: 1.5–2.3, mean Q: 1.93, long-ellipsoid to cylindrical and often strongly constricted. Basidia 2-spored. The remainder of the microscopic characters conform with var. *virginica*. (Fig. 2)

Habitat: Gregarious amongst leaf litter and moss.

Material examined: VICTORIA. Warrandyte State Park, 4 June 1995, B.A.Fuhrer 1936 (MEL 2063191).

Remarks: Macroscopically, this taxon differs from var. *virginica* only in that the centre of the pileus is distinctly brown-tinted. Microscopically, the spores differ as presented in the key. This is the first record of this taxon for Australia. Its characters agree very well with the those in the description by Boertmann (1995).

7. *Hygrocybe arcohastata* A.M.Young, sp. nov.

Pileus 20–40 mm latus, atro-olivaceo-viridis deinde aurantiacus vel aurantiaco-ruber, conicus dein lato-conicus vel applanatus vel umbonatus, glaber, sub-viscidus, ad marginem aequalis vel crenulatus, striatus. Lamellae adnatae vel arcuatae, virescente-flavae dein subaurantiacae, ad marginem concolorae. Stipes 20–40 × 2–4 mm, super sub-viridis, submalvinus, cylindricus, glaber, siccus, ad basim sub-aurantiacus. Sporae 7.5–9.5 × 4.5–6 µm, Q: 1.4–1.8(–2.0), ellipsoideae, hyalinae. Basidia 38–50 × 6–9(–10.5) µm, Q: (3.6–)4.2–6.5, 4-sporea, ad basim fibulata medallionae. Cystidia nulla. Trama hymenophoralis regularis, haud fibulata. Epicutis pilei sub-ixocutem formans; hyphae cuticularis hastatae, pigmentae. Gregaria vel caespitosa in musco sylvestri.

Type: Victoria. Warrandyte State Park, 24.v.1996, B.A.Fuhrer 2064 (holotype MEL 2063201).

Pileus 20–40 mm., at first deep olive-green but dark purple-tinted at the centre and yellow-tinted at the margin, changing to orange or orange-red with the colour change completed before the pileus is fully expanded; conical becoming broadly conical and finally more or less plane with a distinct umbo, smooth, slightly viscid, margin even to crenulate and striate. *Lamellae* adnate with a decurrent tooth or arcuate, greenish yellow becoming orange-tinted with age, margins even and concolorous. *Stipe* 20–40 × 2–4 mm; pale green near the lamellae, mauve-tinted in the middle section and orange-tinted towards the base; more or less cylindrical but a little tapered at the base; smooth, dry. Dried material becomes brownish pink to orange.

Spores 7.5–9.5 × (4.5–)5–6 µm, mean 8.5 × 5.3 µm, Q: 1.4–1.8(–2.0), mean Q: 1.60, ellipsoid, smooth, hyaline, thin-walled, inamyloid. *Basidia* 38–50 × 6–9(–10.5) µm, mean 44.7 × 8.3 µm, Q: (3.6–)4.2–6.5, mean Q: 5.32, 4-spored, with medallion clamps. *Cystidia* absent. *Hymenophoral trama* regular and composed of cylindrical, thin-walled, hyaline, inflated and ellipsoid or moniliform elements 19–125 × 4.5–20.5 µm, clamps absent. *Pileipellis* a weak ixocutis of repent, cylindrical, hyaline, septate hyphae 2–4.5 µm diameter, with spear-like, tapered, acute, pigment-encrusted apices; clamps absent. *Stipitipellis* a cutis of repent, cylindrical, thin-walled, hyaline, septate hyphae 1.5–5.5 µm diameter, clamps absent, pigment granules often encrusted on hyphal walls. (Fig. 3)

Habitat: Gregarious or caespitose amongst moss in eucalypt woodland.

Material examined: Known only from the type.

Remarks: The absence of clamps throughout the basidiome (except at the bases of the basidia where they are of medallion form) indicates that this taxon belongs in sub-genus *Humidicutis* Singer. *Hygrocybe arcohastata* does not approach any European or North American taxa, but it is close to a group of three New Zealand species, *Hygrocybe conspicua* E.Horak, *H. luteovirens* E.Horak. and *H. multicolor* (Berk. & Broome) E.Horak (Horak 1990). *Hygrocybe conspicua* can be separated from *H. arcohastata* because the former has a brilliant orange pileus and similarly coloured lamellae as well as smaller spores (6–7 × 4–4.5 µm). *Hygrocybe multicolor* also has smaller spores (5.5–7 × 4–5 µm)

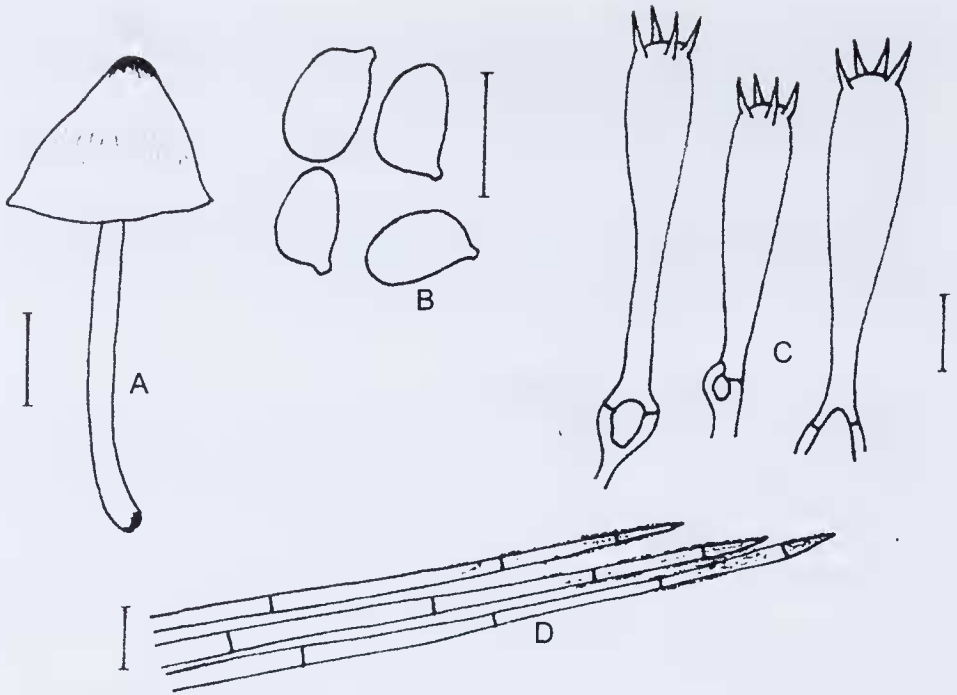


Figure 3. *Hygrocybe arcohastata*. A habit sketch; B spores; C basidia; D cuticular hyphae.

and both pileus and lamellae are olive-green becoming bluish green with age. *Hygrocybe luteovirens* has spores that have a lower upper limit to their range of length and are narrower ($6-8 \times 3.5-4.5 \mu\text{m}$), has olive-green pilei that gradually change to yellow, yellow-brown, brown or reddish brown with age rather than the intense orange or orange-red of *H. arcohastata*, and medallion clamps that have the structure of a normal clamp with a central opening rather than the extremely large 'dough-nut' shape of the medallion clamps found in *H. arcohastata*.

The only other taxon that is similar is the Japanese species *Hygrophorus olivaceoviridis* Hongo (Hongo 1967). This differs in that the pilei remain olive-green, the lamellae are yellowish and the basidia are much smaller ($34-40 \times 7.5-8 \mu\text{m}$).

Etymology: Latin, *arcus* – a rainbow; Latin, *hastatus* – armed with a spear; referring to the numerous colours exhibited by this taxon and the long, spear-like endings of the cuticular hyphae.

8. *Hygrocybe fuhreri* A.M. Young, sp. nov.

Pileus 10–20 mm latus, aurantiaco-brunneus, convexus deinde umbilicatus, glaber, siccus, ad marginem striatus, crenulatus dein aequalis. Lamellae decurrentes, sub-aurantiaco-bubalinae, distantes, ad marginem concolorae. Stipes 30–45 \times 2–4.5 mm, sub-aurantiaco-flavus, glaber, siccus, cylindricus, cavus. Sporae 8–10.5 \times 4–4.5 (–6) μm , Q: 1.7–2.1, ellipsoideae vel cylindricae, hyalinae, aliquot constrictae. Basidia (40–)49–59 \times 5.5–7 μm , Q: 7.1–8.7, 4-sporea, fibulata. Cystidia nulla. Trama hymenophoralis regularis, fibulata. Epicutis pilei cutis formans. Gregaria in humo vel musco sylvestri.

Type: Victoria, Warrandyte State Park, 23.v.1996, B.A. Fuhrer 2054 (holotype MEL 2063199).

Pileus 10–20 mm, reddish orange to orange-brown and darker at the centre, convex and umbilicate, dry, smooth, margin striate, even and a little crenulate. *Lamellae* decurrent, pale orange-buff, distant, margins even and concolorous. *Stipe* 30–45 \times 2–4.5 mm, orange-yellow, cylindrical but tapered at the base, dry, smooth, hollow, often sinuous.

Spores 8–10.5 × 4–5.4(–6) μm, mean 9.0 × 5.1 μm, Q: 1.7–2.1, mean Q: 1.78, ellipsoid to cylindrical, a majority showing some constriction, smooth, hyaline, inamyloid. *Basidia* (40–)49–58 × 5.5–7 μm, mean 57.7 × 6.7 μm, Q: 7.1–8.7, mean Q: 7.69, 4-spored, clamped. *Cystidia* absent. *Hymenophoral trama* regular and composed of short, cylindrical to inflated-ellipsoid, hyaline, thin-walled, elements 22–83 × 4.5–13 μm, clamps present. *Pileipellis* a cutis of repent, cylindrical, hyaline, thin-walled, septate hyphae 2–5.5 μm diameter, clamps present. *Stipitipellis* a cutis of repent, cylindrical, hyaline, thin-walled, septate hyphae 1.7–4.2 μm diameter, clamps present. (Fig. 4)

Habitat: Gregarious in moss and litter in eucalypt woodland.

Material examined: Known only from the type.

Remarks: The regular hymenophoral trama composed of short elements places this species in subgenus *Pseudohygrocybe* M.Bon. No taxon from either Sri Lanka (Pegler 1986) or North America (Hesler & Smith 1963) approaches *H. fuhreri* closely. The only European species which shares some similar characteristics according to both Arnolds (1990) and Boertman (1995) is *Hygrocybe constrictospora* Arnolds; however, that species has bright red pilei which do not (or rarely) become depressed or umbilicate, bright yellow stipes, smaller basidia (35–45 × 5–7.5 μm) and spores that exhibit very strong constrictions rather than the minor constrictions that are present in *H. fuhreri*. Several orange and/or yellow species from New Zealand (Horak 1990) approach *H. fuhreri* but each is readily separated: *Hygrocybe elegans* E.Horak has a trichoderm on the pileus; *Hygrocybe procera* has much larger spores (11–17 × 7–10 μm); *Hygrocybe cerinolutea* E.Horak does not have constricted spores and the pileus does not become umbilicate; and *Hygrocybe blanda* E.Horak has much smaller spores (5.5–7 × 4–4.5 μm).

Etymology: named after Mr B.A. Fuhrer of Ringwood, Melbourne Victoria; photographer, naturalist and mycologist.

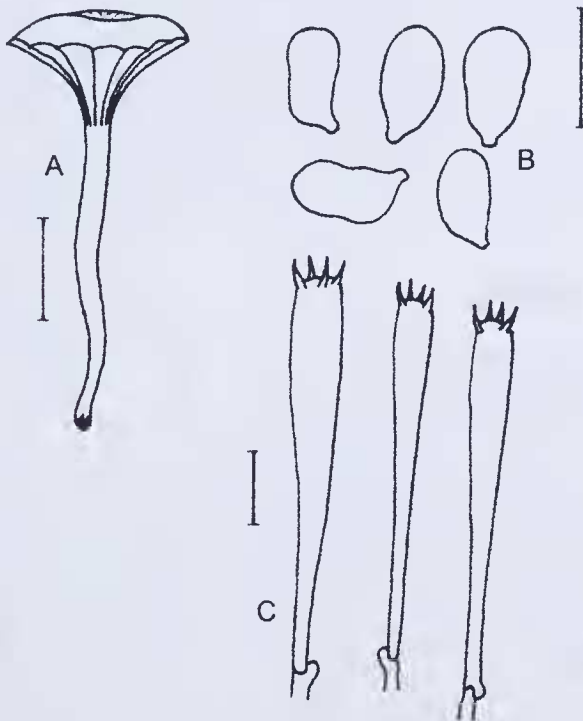


Figure 4. *Hygrocybe fuhreri*. A habit sketch; B spores; C basidia.

9. *Hygrocybe saltorivula* A.M.Young, sp. nov.

Pileus 20–35 mm latus, aurantiacus vel aurantiaco-rubus, conicus deinde umbonato-applanatus, viscidus, ad marginem sub-striatus, sub-flavus. Lamellae adnatae, ventricosae, aurantiaco-rosae, ad marginem sub-flavae. Stipes 30–40 × 2–4 mm, aurantiaco-roseus vel aurantiacus, glaber, lubricus deinde siccus, cavus. Sporae 7.5–9(–9.5) × 4–5 μm, Q: 1.6–2.2, ellipsoideae vel cylindricae, hyalinae, aliquot constrictae. Basidia 37–49 × 5.5–9 μm, Q: 5.2–5.7, 4-sporea, fibulata. Cystidia nulla. Trama hymenophoralis regularis, fibulata. Epicutis pilei ixotrichoderm formans. Gregaria in musco sylvestri.

Type: Victoria. Warrandyte State Park, 23.v.1996, *B.A.Fuhrer 2053* (holotype MEL 2063200).

Pileus 20–35 mm, orange, orange-red to cherry-red, broadly conical becoming plane but with a central umbo, viscid, smooth, margins even, a little striate and slightly yellowish. *Lamellae* adnate, ventricose, orange-pink, margins yellowish or a little paler. *Stipe* 30–40 × 2–4 mm, orange-pink or orange especially when older, smooth, slippery or soon dry, cylindrical, hollow.

Spores 7.5–9(–9.5) × 4–5 μm, mean 8.3 × 4.4 μm, Q: 1.62.2, mean Q: 1.89, ellipsoid to cylindrical, hyaline, smooth, thin-walled, inamyloid, a majority strongly constricted. *Basidia* 37–49 × 5.5–9 μm, mean 42.7 × 7.2 μm, Q: 5.2–7.2, mean Q: 5.95, 4-spored, clavate, thin-walled, hyaline, clamped. *Cystidia* absent. *Hymenophoral trama* regular and composed of cylindrical, ellipsoid or moniliform elements which are hyaline, thin-walled 37–110 × 7–30 μm, clamps present: lactifers present as highly refractive, winding, thin-walled, hyaline hyphae 1.5–4 μm diameter. *Pileipellis* an ixotrichoderm up to 50 μm deep, composed of hyaline, thin-walled, clamped hyphae 2.5–4 μm diameter, apices often swollen. *Stipitipellis* a weak ixocutis of repent, hyaline, thin-walled, clamped, partially gelatinised hyphae 1–3.5 μm diameter. (Fig. 5)

Habitat: Gregarious amongst deep moss in eucalypt woodland.

Material examined: Known only from the type.

Remarks: The regular hymenophoral trama composed of short elements places this species in subgenus *Pseudohygrocybe* M.Bon. The basidiomes of *Hygrocybe saltorivula* strongly resemble mature fruiting bodies of *Hygrocybe cerasinomatata* A.M.Young which change from cherry-red to golden orange (Young & Wood 1997); however, the latter is easily separated microscopically by its very regular hymenophoral trama of tubular, aseptate elements. *Hygrocybe saltorivula* also approaches *Hygrocybe julietae* (G.Stev.) E.Horak from New Zealand but that species has a convex pileus, arcuate lamellae and

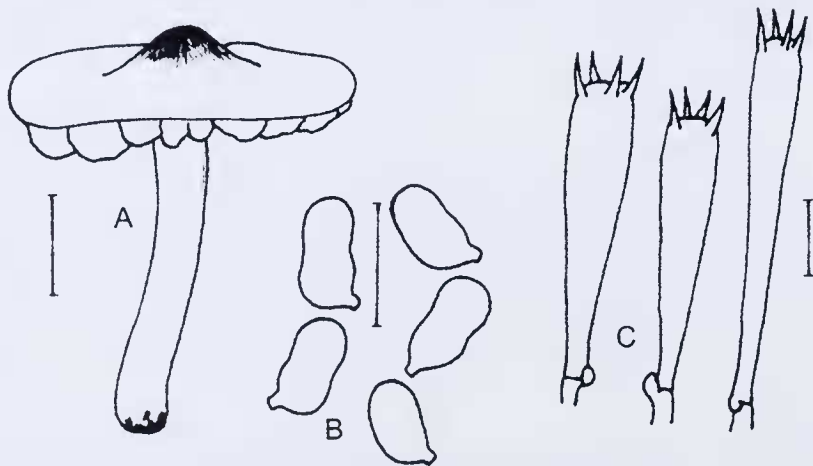


Figure 5. *Hygrocybe saltorivula*. A habit sketch; B spores; C basidia.

much smaller spores ($6-8 \times 3-3.5(-4) \mu\text{m}$). The South American species *Hygrocybe araucana* Singer differs by having a convex pileus and a dry cutis (Horak 1979).

Etymology: Latin, *saltus* – to jump; Latin, *rivulus* – a small stream; from the name of the type locality.

Taxa with Limited Collections

During this study, three collections made from the Jumping Creek Nature Walk area were considered to be new species but were found to consist of only two or three basidiomes which is considered insufficient material for a valid description and deposition of a suitable type. These collections have provided well defined characters for two taxa. The descriptions are provided here to facilitate further studies.

Hygrocybe sp. JCR1

Pileus 10–20 mm, pale orange, luteous or slightly ochre tinted yellow, strongly viscid to near glutinous, convex with a central umbo or umbonate, smooth, margins somewhat crenulate. *Lamellae* deeply decurrent, white or pale cream-coloured, margins concolorous. *Stipe* 30–40 \times 2–4 mm, whitish to pale yellow or pale orange but paler or near white near lamellae, smooth, dry, tapered downwards.

Spores 8.5–11(–11.5) \times 4–6 μm , mean 9.8 \times 5.1 μm , Q: 1.7–2.5, mean Q: 1.91, ellipsoid to lacrymoid or subcylindrical, hyaline, thin-walled, inamyloid; subcylindrical spores may occasionally be slightly constricted. *Basidia* (28–)37–49(–52) \times 4.5–7 μm , mean 43.3 \times 5.6 μm , Q: 5.5–10.3, mean Q: 7.68, 2-spored with scattered 1-spored basidia, clamps absent. *Cystidia* absent. *Hymenophoral trama* irregular and composed of hyaline, thin-walled, cylindrical, septate, often branching hyphae 24–78(–100) \times 2–5(–8.5) μm , clamps absent. *Pileipellis* a well developed, loose ixocutis or reduced ixotrichoderm composed of repent to loosely interwoven, cylindrical, hyaline, thin-walled, septate hyphae 1–5 μm diameter, clamps absent. *Stipitipellis* a cutis composed of repent, cylindrical, hyaline, thin-walled, septate hyphae 1–3.5 μm diameter, clamps absent. (Fig. 6)

Habitat: Gregarious in moss under *Kunzea ericoides*.

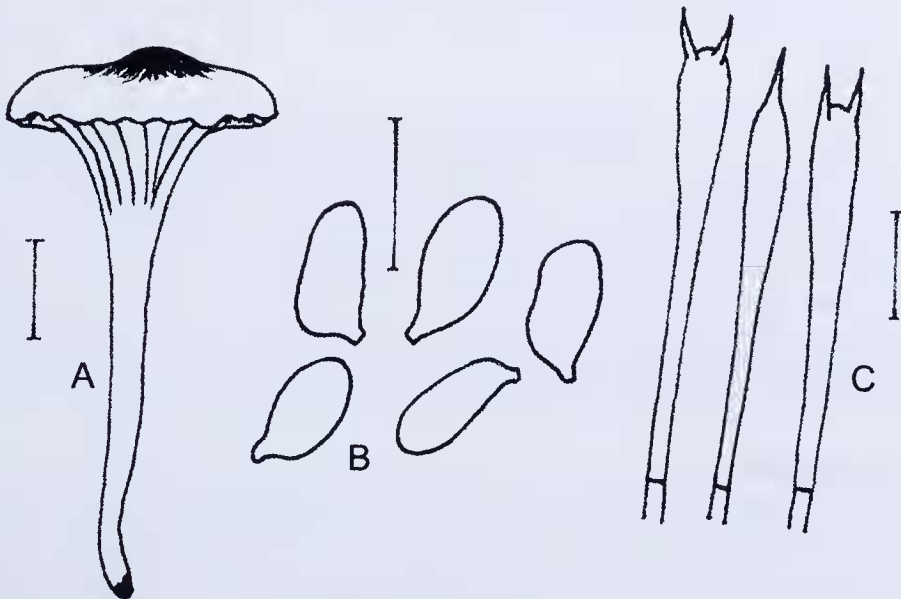


Figure 6. *Hygrocybe* sp. JCR1. A habit sketch; B spores; C basidia.

Material examined: VICTORIA, Warrandyte State Park, 10.vi.1995, B.A.Fuhrer 1941 (MEL 2063189); Warrandyte State Park, 10.vi.1995, B.A.Fuhrer 1945 (MEL 2063196).

Remarks: This species should be very easy to recognise in any future study since highly glutinous pilei in sub-genus *Cuphophyllus* (defined by an irregular hymenophoral trama) appear to be uncommon.

Hygrocybe sp. JCR2

Pileus 10–20 mm, bright scarlet, fading a little with age, obtusely conical to conical, dry (possibly developing a slightly lubricous surface during maturation) and may appear very finely squamulose in dry conditions; margins striate, yellowish and even to sub-crenulate. *Lamellae* broadly adnate and often with decurrent tooth, buff pink, margins concolorous and even. *Stipe* 30–40 × 3–4 mm, orange-yellow with or without pink tints, cylindrical, dry, hollow, smooth but a fine pruinose, yellowish layer more or less covering the stipe surface when immature but becoming more scattered and flocculose with maturity.

Spores 8.5–11(–11.5) × 5–6(–7.5) µm, mean 9.7 × 5.7 µm, Q: (1.3–)1.4–1.9(–2.0), mean Q: 1.69, ellipsoid to obovoid or sub-cylindrical, smooth, hyaline, thin-walled, inamyloid; sub-cylindrical spores may occasionally exhibit small but distinct constrictions. *Basidia* 42–50 × 8–9.5 µm, mean 47.0 × 8.8 µm, Q: 4.9–6.3, mean Q: 5.38, 4-spored, clamped. *Cheilocystidia* and *pleurocystidia* absent. *Hymenophoral trama* regular and composed of a mixture of cylindrical and inflated moniliform elements which are hyaline, thin-walled, septate 30–100 × 5–27 µm, clamps present; lactifers occasionally present as highly refractive, branching, often contorted hyphae 4–8.5 µm diameter. *Pileipellis* a cutis of repent, hyaline, thin-walled, septate, cylindrical and somewhat inflated hyphae 3–9 µm diameter, overlying a subcuticle of moniliform elements similar to those of the hymenophoral trama; lactifers similar to those of the hymenophoral trama present in the subcuticular layer. *Stipitipellis* a cutis of hyaline, thin-walled, repent, cylindrical, septate hyphae, 2.5–5 µm diameter, clamps present. The cuticular hyphae exhibit some weak gelatinisation. *Caulocystidia* present as hyphal fascicles up to 100 µm high and composed of tangled or contorted hyphae which are cylindrical, rounded at the apices, hyaline, thin-walled, clamped and 3–5 µm in diameter. (Fig. 7)

Habitat: Gregarious in moss.

Material examined: VICTORIA, Warrandyte State Park, 21.v.1996, B.A.Fuhrer 2043 (MEL 2063195).

Remarks: The dried material exhibits a 'varnished appearance' on both pileus and stipe surface which is indicative of an ixocutis. Microscopic examination did not show the presence of a gluten layer but did show some gelatinisation of surface hyphae on both pileus and stipe; however, there were very few adherent spores on the stipe which is contrary to the case if an ixocutis were developed. If an ixocutis is present in juvenile basidiomes, it will be very weak and the surfaces will be lubricous at most. This spectacular taxon should be easily identified as there is no other Australian species that shows the fine, yellow pruinose layer over the immature stipe with residues on the mature stipe. It appears to approach the European *Hygrocybe coccinea* (Schaeff. : Fr.) P.Kumm. but that species has a convex pileus and does not have caulocystidia on the stipe.

Acknowledgements

The author wishes to thank Mr Bruce Fuhrer of Ringwood, Melbourne for his considerable generosity in not only allowing access to his Jumping Creek collections but also in providing superb field photographs of the material. His help and willing assistance during the examination of these collections, both with additional field notes and descriptions of the park flora, is also very gratefully acknowledged. This investigation was completed

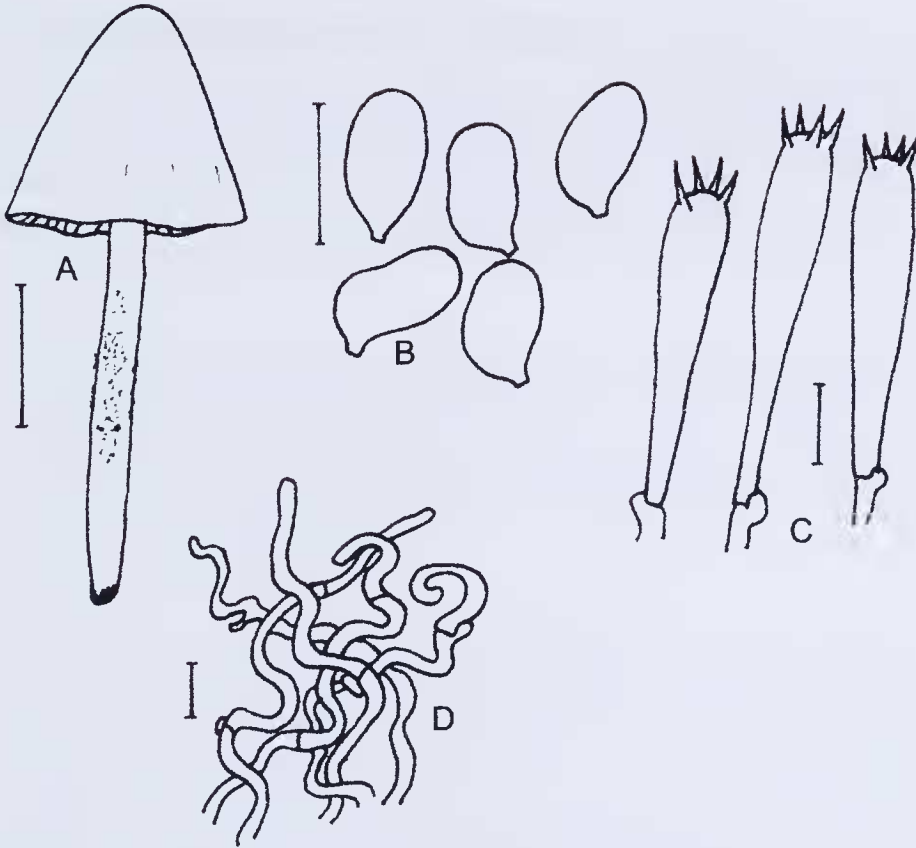


Figure 7. *Hygrocybe* sp. JCR2. A habit sketch; B spores; C basidia; D caulocystidia.

under a grant provided by the Australian Biological Resources Study for research into the species of the Hygrophoraceae of south-eastern Australia.

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